R3842-1F

(REPORT SUMMARY)

PHYSICAL FITNESS TRENDS IN AMERICAN YOUTH

1980 - 1989

A STUDY CONDUCTED BY THE CHRYSLER-AAU PHYSICAL FITNESS PROGRAM

Wynn F. Updyke, Ph.D., Program Director
Associate Dean for Academic Affairs
School of Health, Physical Education & Recreation
Indiana University
Bloomington, Indiana

Michael S. Willett, M.S., Program Manager

For Further Information Contact:

Chrysler Fund-AAU Physical Fitness Program
Poplars Building
Bloomington, Indiana 47405
(812) 855-2227

1989 PRESS CONFERENCE - WASHINGTON, D.C. - SEPTEMBER 14, 1989

CHRYSLER-AAU PHYSICAL FITNESS PROGRAM
PRESS CONFERENCE
September 14, 1989

Willard Intercontinental, Washington, D.C.

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Indiana University
Director, Chrysler-AAU Physical Fitness Program

I. Background.

The Fitness Profile of American Youth (Press Kit) contains information relating to the history of the test, first introduced in 1943.

Purpose of the Program: To enhance the FITNESS LITERACY of young Americans. Fitness Literacy consists of two components: 1) Knowledge and 2) Experience.

> Knowledge: What physical fitness is; its benefits, its limitations; how it is acquired; how it is maintained; its relationships to disease prevention, mental health, physical and mental efficiency and productivity.
>
> Experience: The personal experience of having acquired an enhanced state of physical fitness. Physiological adaptation to the stimulus of vigorous exercise.

Goal of the Program: To empower young people to take greater responsibility for their own well-being.

Means of Goal Achievement: 1) Reduction of the risk factors associated with degenerative disease (heart disease, obesity, hypertension, osteoporosis, low back syndrome, etc.) 2) Improved physiological efficiency 3) Enhanced self esteem (through self discipline, sense of achievement, sense of greater control of one's life) 4) Enrichment of Life (through increased energy, reduced stress, enhanced capacity to pursue opportunities).

Primary Tools: Motivational Incentives
Students: Certificates of Achievement
Teachers: Free student awards; motivational posters; motivational/instructional video; teacher-tested curriculum modules ("Developmental Physical Fitness," "Nutrition for Fitness and Performance"), Family Fitness Program, computer software (record keeping, award ordering, report generation for parents, school boards, etc.), special program adaptations for handicapable students; teacher certificates, school certificates, incentive gifts (caps, key fobs, etc.).

II. Data source.

Each year a sample consisting of at least 12,000 subjects (500 of each sex in each of 12 age groups) is randomly drawn from the population of students taking the AAU test. (Actual sample size for any given year has reached as high as 18,000.) All fifty states are represented in the sample.

In addition, questionnaires are distributed to all participating teachers requesting information on several variables. Questionnaires are coded so that responses can be correlated with test performances of particular subpopulations.

III. Test Battery

Required Events	Optional Events
Endurance Run	Long Jump
Pullup OR	Sprint
Flexed Arm Hang	Shuttle Run
Sit and Reach	Modified Pushup
Situp	Isometric Pushup
	Isometric Squat

Participants must perform ALL Required events plus ONE Optional event.

All composite scores (T Scores) or averages of fitness levels are calculated using REQUIRED EVENTS ONLY.

Components of Physical Fitness:

1. Strength
2. Muscular Endurance
3. Flexibility
4. Circulo-respiratory Endurance

In order to enhance interest in taking the test, several tests of Motor Ability (skill) are included as OPTIONAL events.

Because of field testing constraints, no test item is included for the unique measurement of strength. Several test items provide estimates of strength and muscular endurance in combination.

IV. Interpreting Test Scores

Because the components of physical fitness are independent (not correlated with each other), it is not possible to construct a meaningful SINGLE index of physical fitness. It is most instructive to study trends by examination of annual mean scores for <u>each</u> of the test items.

For certain purposes (such as ranking states) a statistical means of converting test scores to a common scale has been used (T Scores). This procedure permits the averaging of scores but must be interpreted with caution. (Very much like averaging oranges and apples.) It should be remembered that an abundance of flexibility, for example, cannot offset a deficiency in circulo-respiratory endurance, etc.

V. Findings

1. The Good News

A. Situps. (Strength and Endurance of abdominal muscles and hip flexors) (Figures 1 & 2)
Definite improvement over the decade for all age groups and both sexes. Special emphasis on this test item resulting from criticism of weaknesses in this measure in previous studies may have had some bearing on improvement.

B. Flexed Arm Hang -- Girls. (Strength and endurance of arms and shoulder girdle) (Figure 3)
Scores on this event have been very erratic until 1985 when a sharp upward trend emerged. It should be noted that these scores are still relatively poor, and appear to have leveled off over the past three years. This test is given because so many girls are unable to perform even a single pullup. The improvement is encouraging but goals should not be set too low. Improvement may reflect, in part, changed attitudes toward strength developing activities for girls.

C. Pullups -- Boys. (Strength and endurance of arms and shoulder girdle.) (Figure 4)
A mixed bag. After several years of gradual decline there appears to be a significant recovery in the older age groups, but not in those below age 14. The reasons for the decline (and recovery) are not apparent. Increased body weight may be a factor but cannot be the total explanation.

D. Sit and Reach. (Flexibility of back and hamstrings) (Figures 5 & 6)
This item is a recent addition to the AAU test battery (1986).
Dramatic initial improvement may reflect increasing familiarity with the test and required technique. Girls scores reflect typical superiority over boys in this component.

2. The Bad News

A. Endurance Run. (Circulo-respiratory Endurance)
(Graphs: Recall that higher numbers indicate slower performances.)
(Figures 7 & 8)
Despite occasional temporary recoveries, age groups from 10 and up (both boys and girls) demonstrated a disturbing decline in stamina over the decade.

Aerobic capacity is of great importance because of its relationship to the risk of heart disease. Its improvement requires rhythmic exercise sufficient to keep the heart rate elevated moderately for at least 20 minutes at least three times per week. Teachers find it difficult to devote sufficient in-class time to aerobic activities year round. Many schools devote far less than three periods per week to physical education. Teachers, who are obligated to teach motor skills as well as develop fitness, find themselves in a very difficult situation.

B. Body Weight. (Figures 9 & 10)
Any test that requires the support of one's own body weight for extended periods of time is certain to be negatively affected if body weight is excessive. The significant increases in mean body weights of all older age groups, both boys and girls, may partially account for the observed decline in endurance run performance. It should be noted that this weight increase cannot be explained on the basis of any commensurate increase in height.

In the absence of direct measurements it is not certain that the weight gain resulted from an increase in body fat. However, evidence from recent related studies tends to support such an assumption.

An increase in muscle mass would also create an increase in body weight, of course. The fact that scores on the flexed arm hang and pullups have shown some improvement might be consistent with an hypothesis of increased muscle mass. However, this is the only bit of evidence that provides any support for such a possibility. Both fat and muscle may have increased.

The observed creeping weight gain is considered ominous, and appears to be consistent with reports of increasingly sedentary lifestyles and unbalanced nutritional habits of American youngsters.

C. Achievement of Standards. (Figure 11)
Examination of the distribution patterns of awards reveals that the proportion of participants reaching or exceeding minimal standards on all four required tests declined over the decade from 43% to 32%. This decline appears to be due primarily to poorer performances on the endurance run.

The percentage of those attaining outstanding levels has remained relatively constant at about 6% with a high of 8% (1981, '82, '83) and a low of 5% ('84 and '85).

VI. Questionnaire Information

1. Teacher's Primary Objectives (Figure 12)

It is important to remember that the improvement of physical fitness is only one of many objectives pursued by physical education teachers. Even in this sample of teachers who are clearly very interested in physical fitness (recording and sending in all their data is a great deal of work), only 46% listed fitness improvement as their primary objective.

Obviously very little fitness development occurs by accident. Real progress will require establishment of clearly formulated, positive objectives.

2. Perceptions of Outcomes (Figure 13)

Although little research has been reported on the relationship between fitness and self esteem in youngsters, almost 60% of our teachers considered the enhancement of self esteem to be the primary benefit of physical fitness development. Thirty-four percent regarded the prevention of disease as primary outcome.

It seems logical to conclude that these teachers' choices reflect the more immediate concerns of their students. It might be speculated that under these conditions aerobic activity might tend to be slighted in favor of anaerobic sports and games which tend to involve more extensive social interaction.

3. Type of School (Figures 14 & 15)

In 1984 private schools enjoyed a clear superiority in several of the test items. Since that time, however, public schools have narrowed the gap and, in some events, surpassed the private schools. The reason for this trend is not apparent.

4. Teachers as Role Models (Figures 16 & 17)

Do students whose teachers consider themselves to be good role models produce higher fitness scores than others? In general, yes, but it varies greatly with events and age groups. However, the effect seems to be much stronger with older youngsters and more important for girls than for boys.
It doesn't seem to make any difference, in terms of mean scores, whether or not the teacher customarily exercises with the students.

5. Gender of the Teacher (Figures 18 & 19)

Does it make any difference whether the teacher is male or female? Yes, if no other factors are considered. However, it seems that "fitness credibility" may be the real issue. Among teachers who were also coaches, scores were actually slightly higher for students of females.

VII. State Rankings (Figures 20, 21, 22)

Which states seem to be doing the best job in promoting physical fitness?

CAUTION ! Ranking is a precarious business. There is great variability from year to year, partly because there is very little difference between adjacent scores. While there may be very little difference among the top ten, there is substantial difference between the top ten and the bottom ten.

Rankings are based upon scores on the four required events only. Rankings vary greatly when different ages and sexes are considered separately. States ranking high on elementary school age performance may not do so with respect to high school, etc. (See lists provided in the press kit.)

In the interests of positive reinforcement, rankings are limited to the top ten for 1988. (Full 1989 data not yet available.) Two lists are provided: 1) Ages 6-13; 2) Ages 14-17.

A third list contains those states achieving top ten status with respect to both groups of students (6-13 and 14-17) in the same year over the last five years.

VIII. Conclusions

1. A major problem appears to exist with respect to circulo-respiratory endurance. New ways need to be found to emphasize aerobic activities since time constraints are so acute in most schools.

2. Steadily increasing body weight (in the absence of height increases) confirms the need for greater attention to appropriate diet and physical activity.

3. Further enhancement of fitness levels will require a re-examination of objectives at the local level. The development of fitness literacy cannot be achieved without conscious planning and direction of effort.

4. Of all the variables affecting fitness levels, the teacher is the most important. They control the curriculum and are in position to provide the necessary motivation and information.

5. Evidence from this study is consistent with reports from other sources indicating that young people in America are gradually becoming more sedentary.

IX. Recommendations

1. The best investment parents can make in the physical fitness of their children is to insist on high quality physical education programs in their schools.

2. Fitness literacy, (the personal experience of becoming fit, for the short term, and the acquisition of knowledge about fitness and its maintenance for the long term) is the right of every child. Merely forcing children to exercise is neither adequate nor appropriate. The development of the desired understanding, attitudes and behaviors can only be achieved through a consistent, well-conceived educational program under the direction of qualified, dedicated teachers.

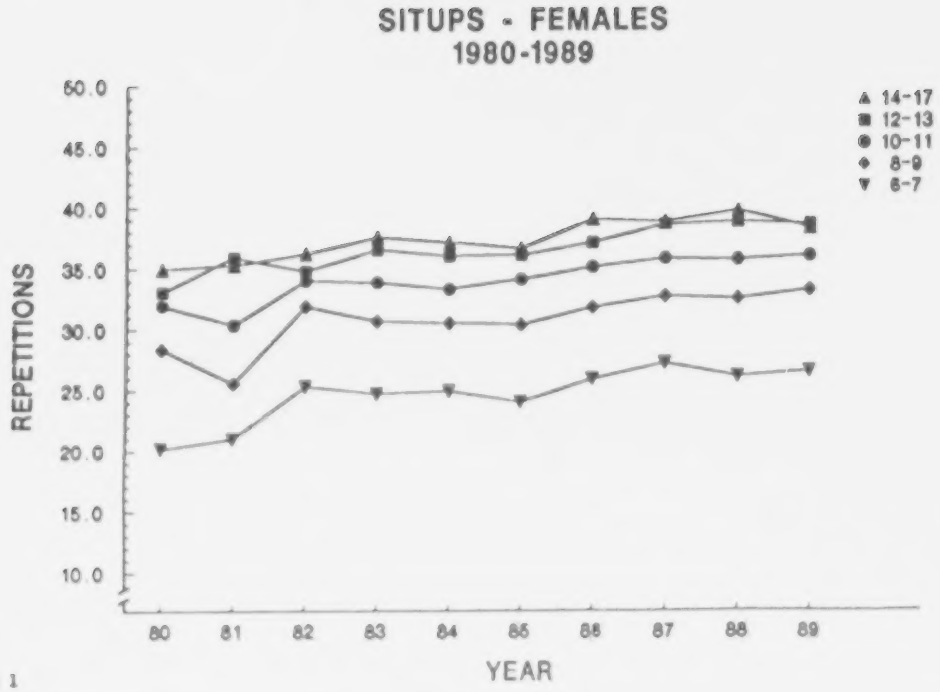


FIGURE 1

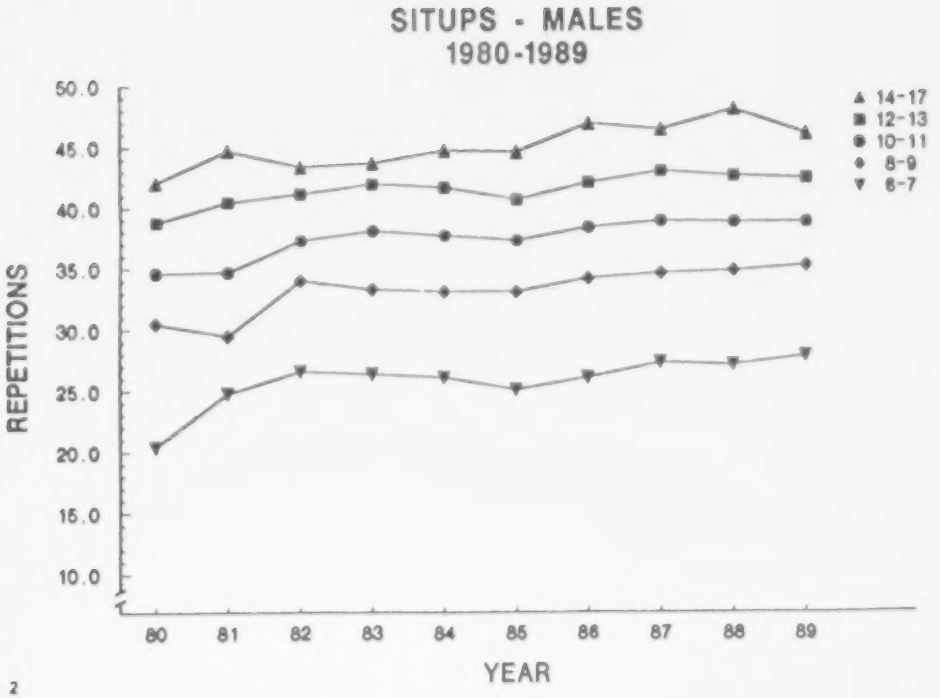


FIGURE 2

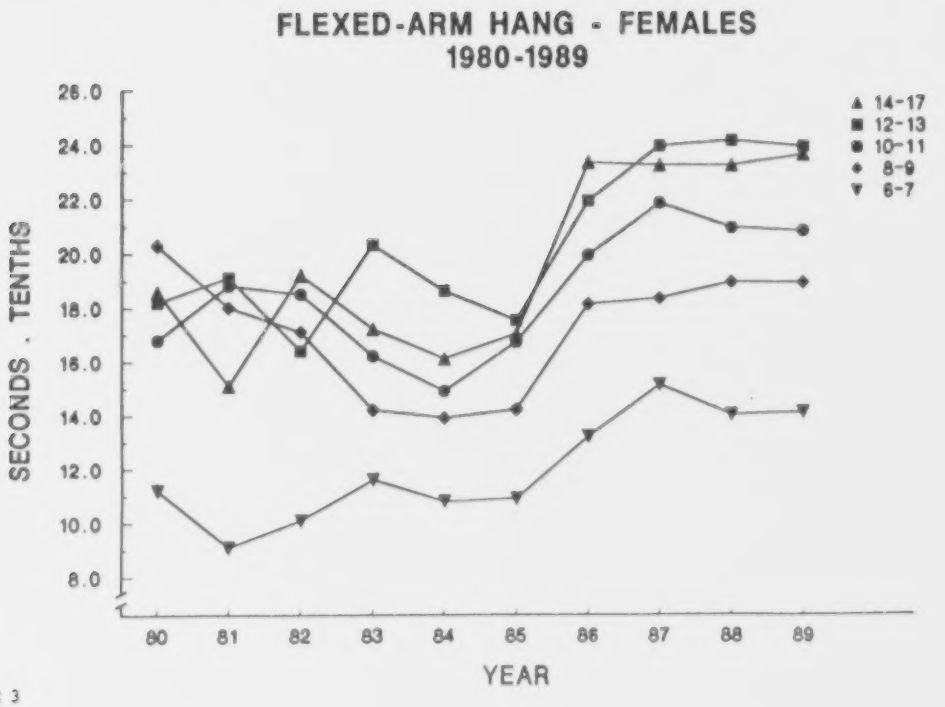
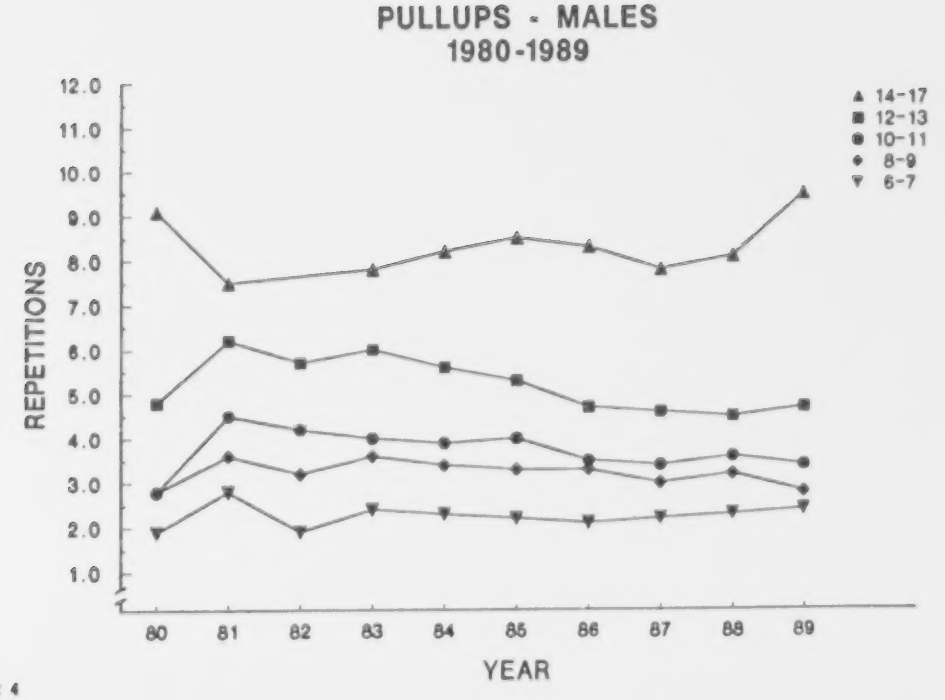


FIGURE 3



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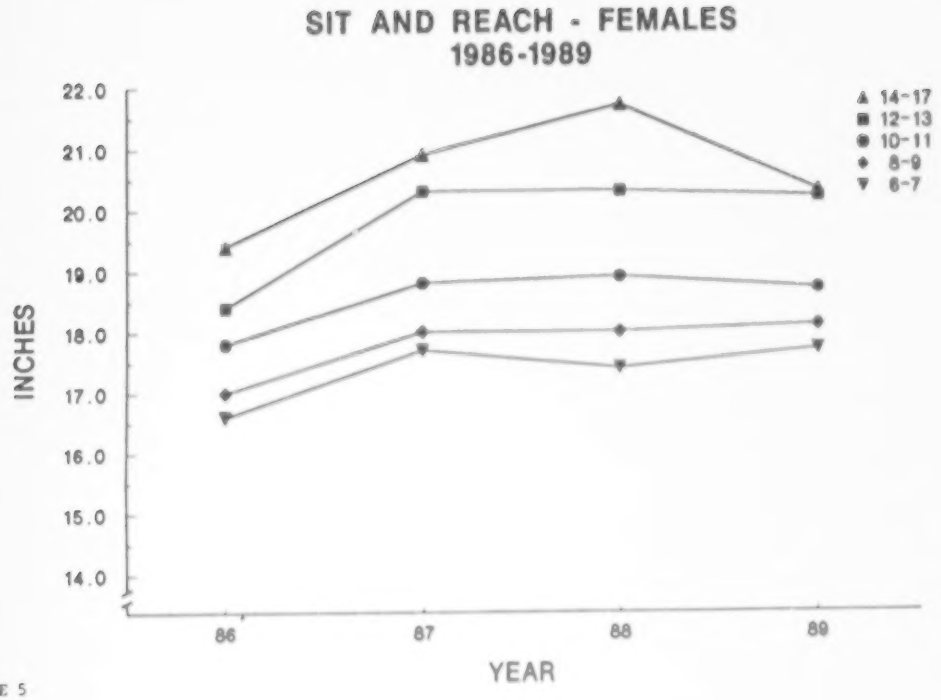
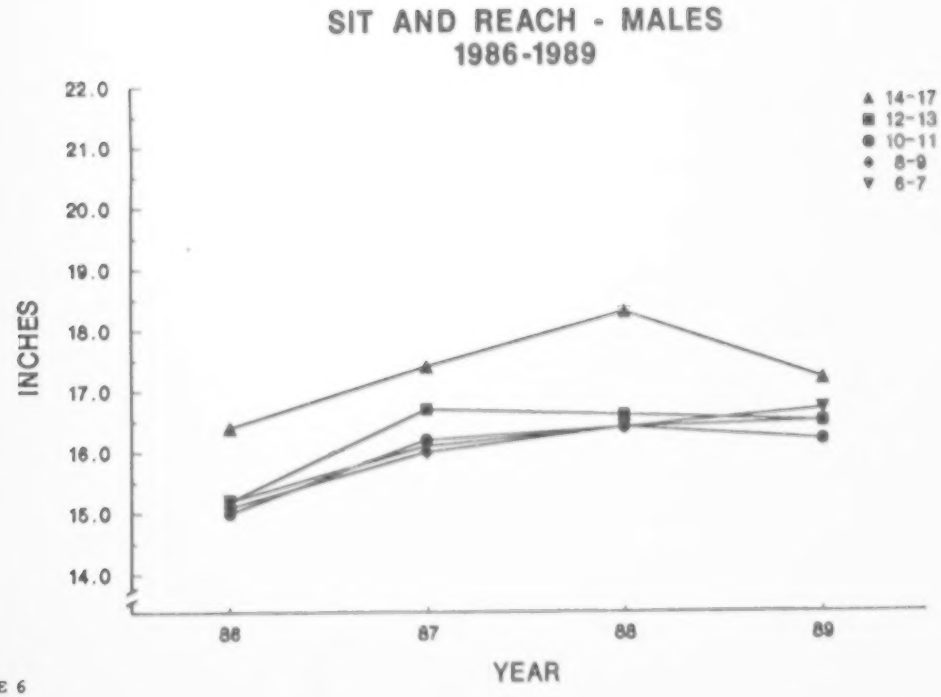


FIGURE 5



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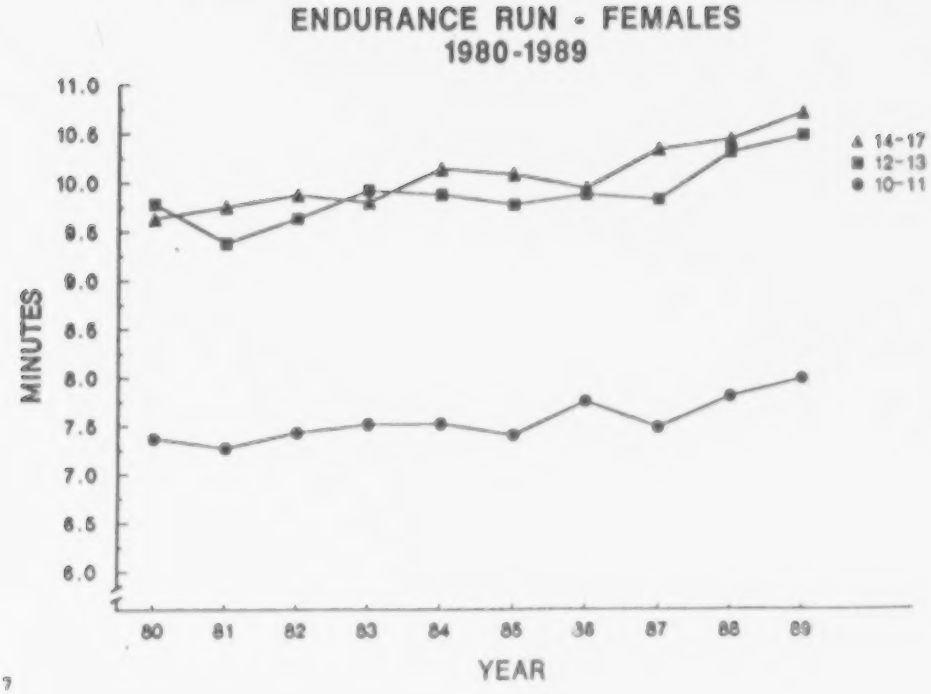

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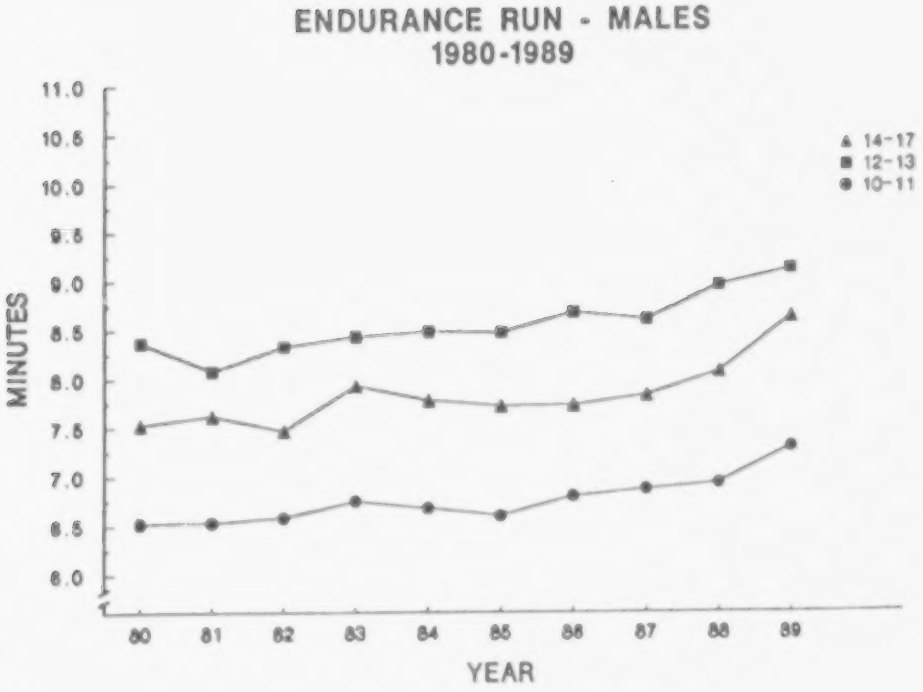

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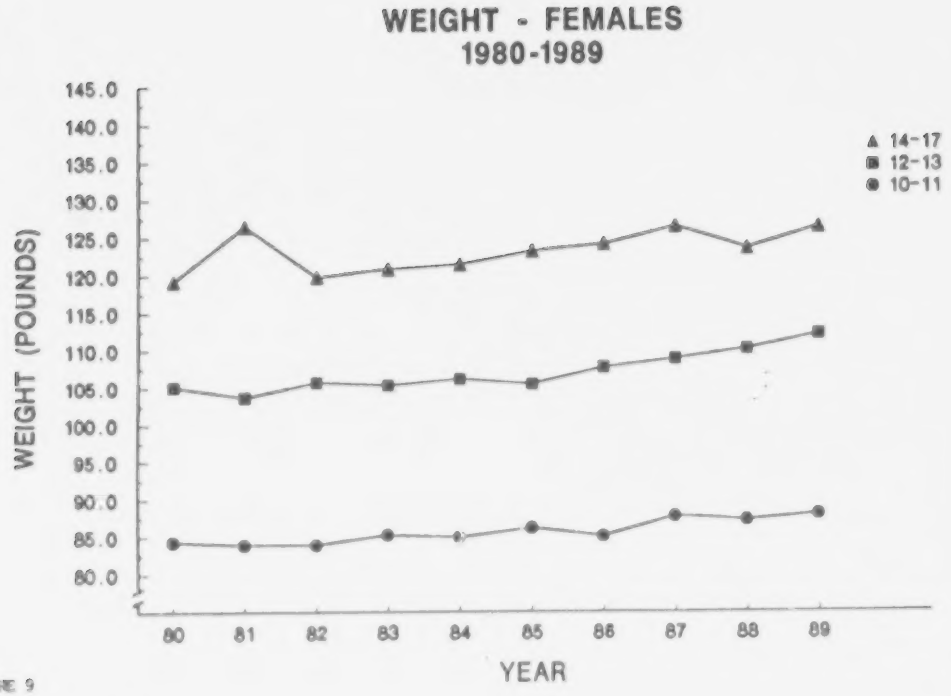

FIGURE 9

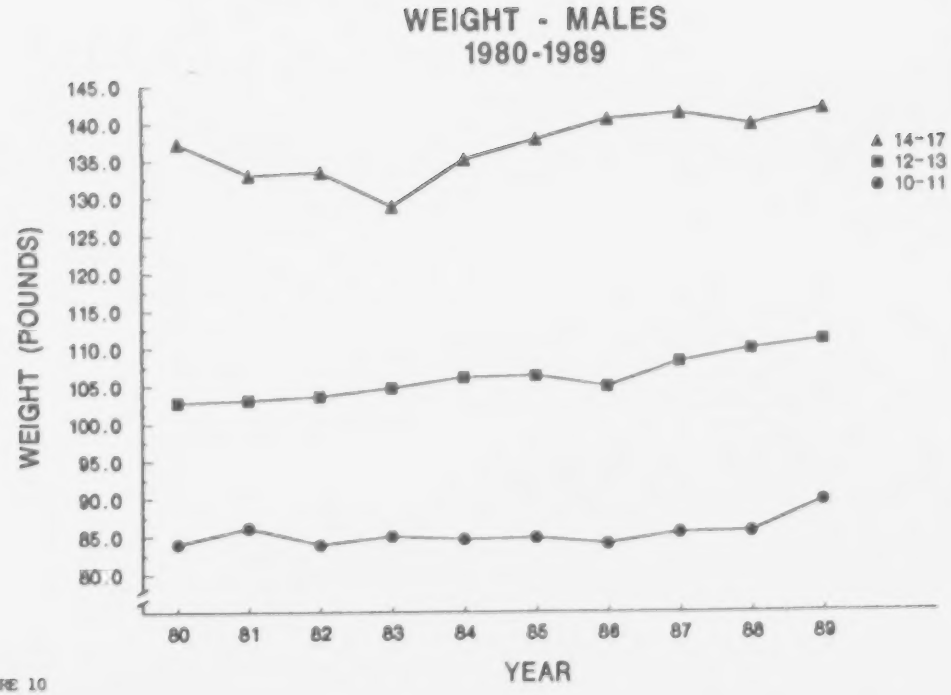

FIGURE 10

DISTRIBUTION OF CERTIFICATES AWARDED
1981-1989

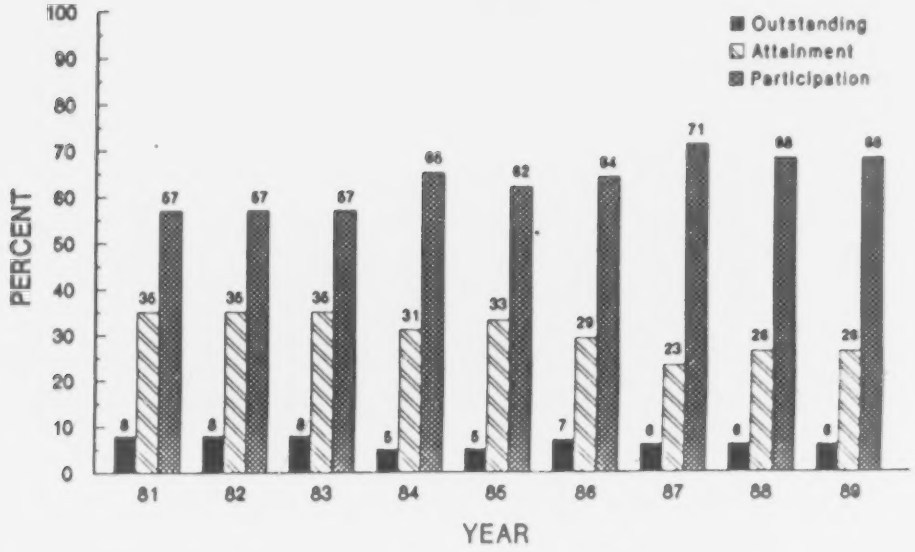

FIGURE 11

PRIMARY PROGRAM OBJECTIVES AMONG TEACHERS
1988

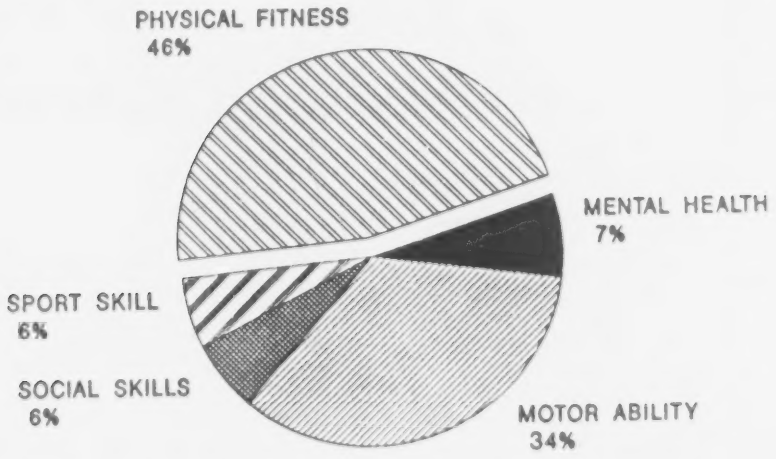

FIGURE 12

TEACHER PERCEPTIONS OF PHYSICAL FITNESS BENEFITS 1988

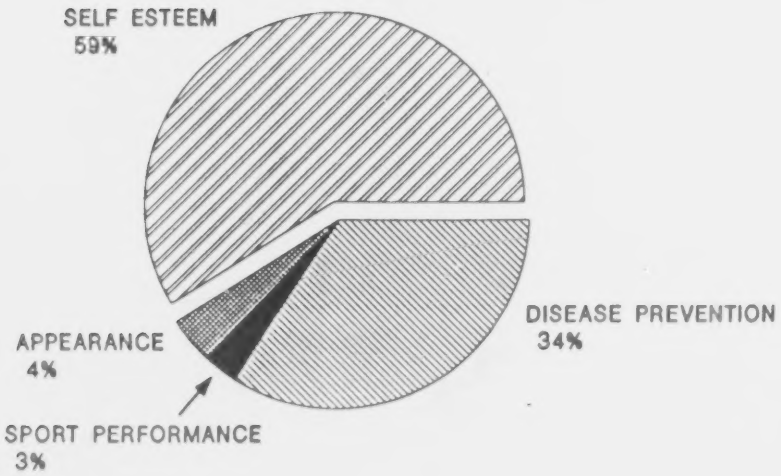

FIGURE 13

PRIVATE vs. PUBLIC SCHOOLS 1984-1989

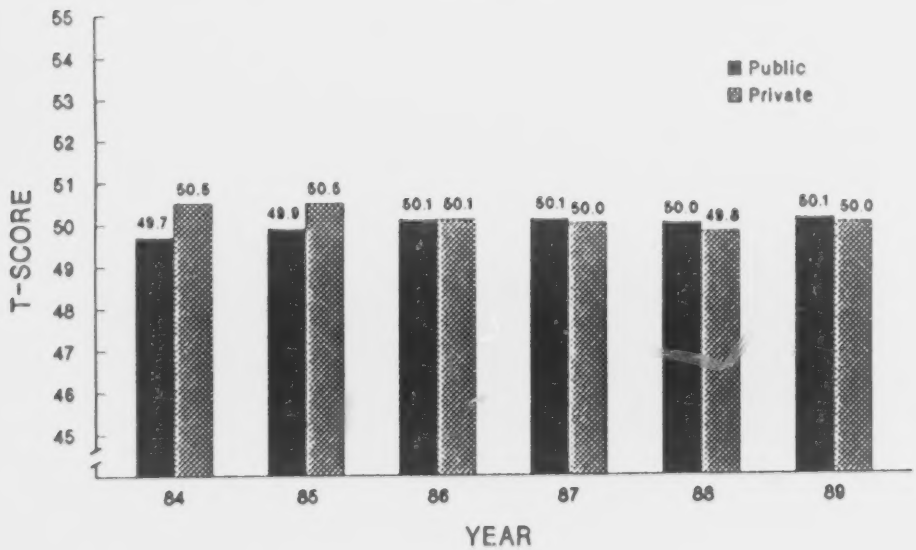

FIGURE 14

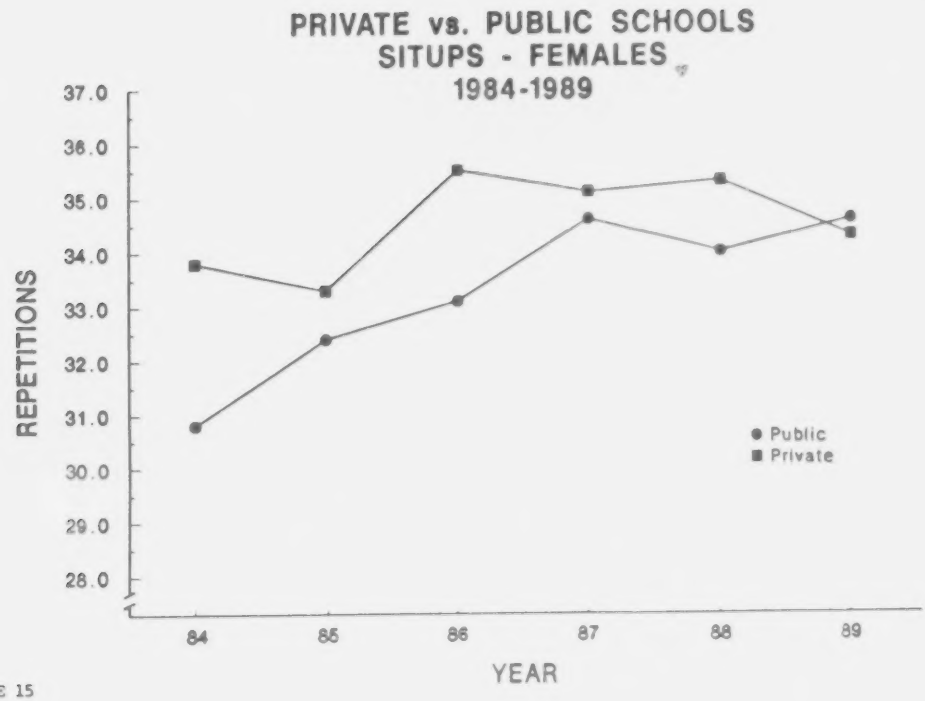

FIGURE 15

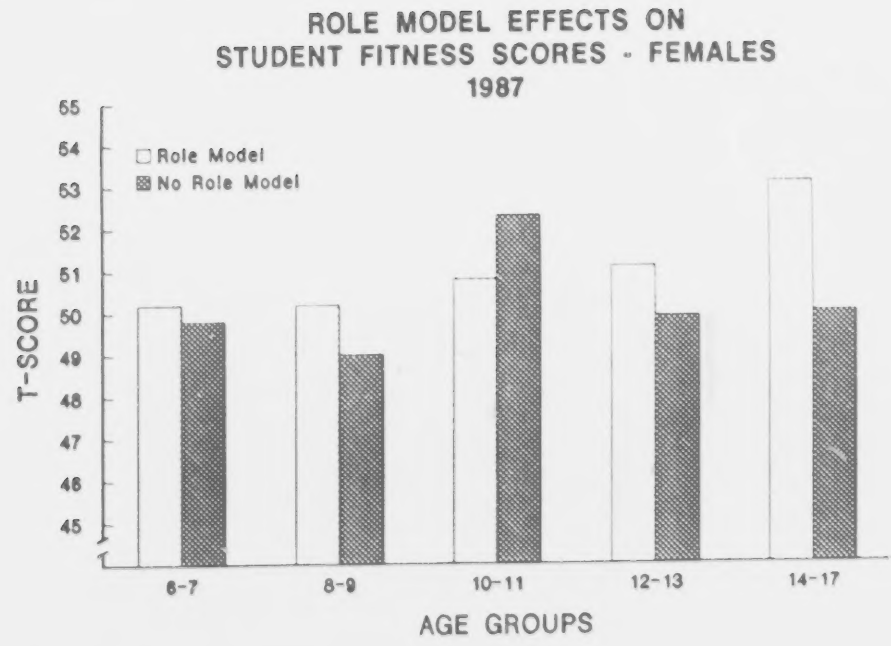

FIGURE 16

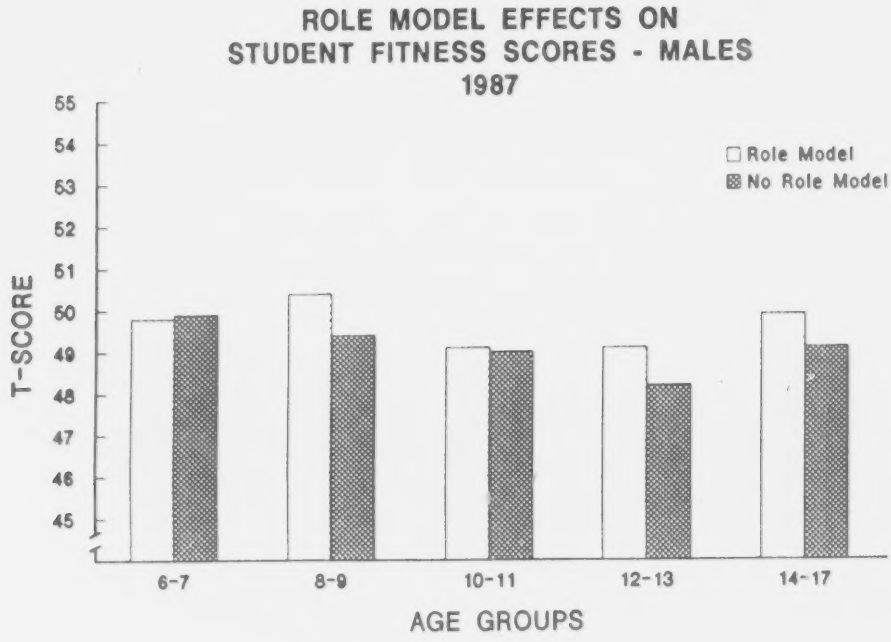

FIGURE 17

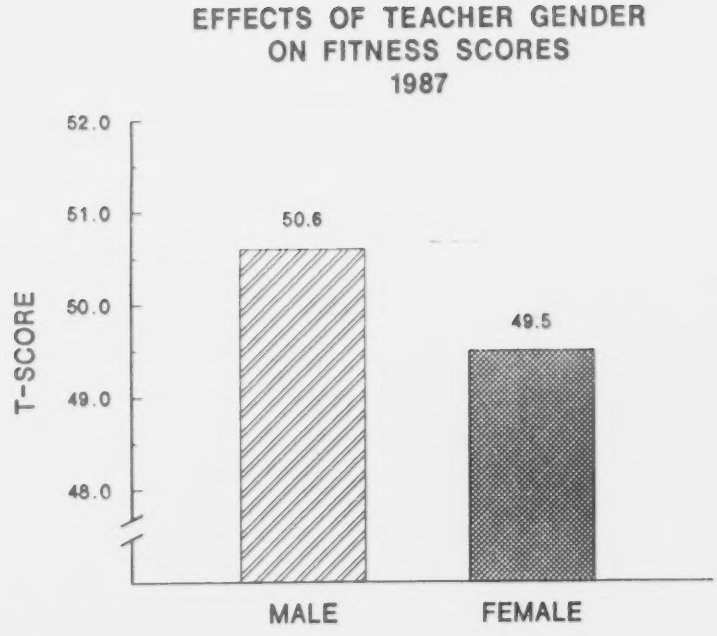

FIGURE 18

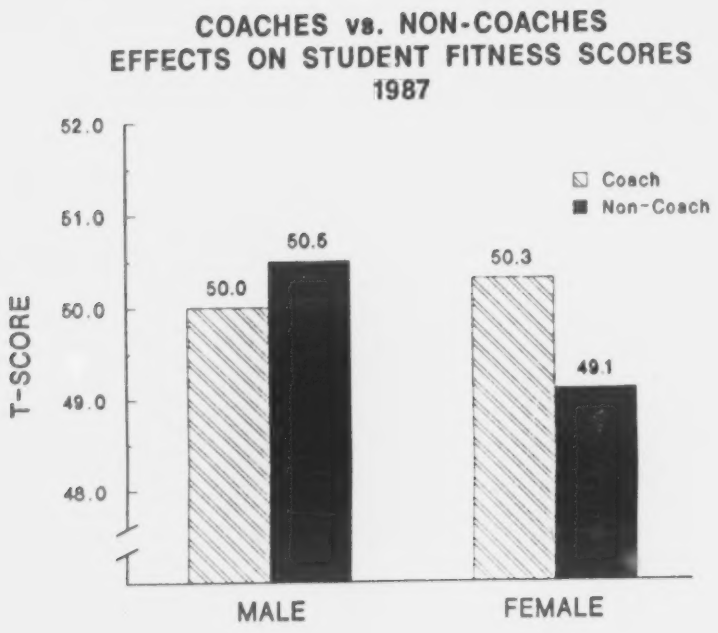

FIGURE 19

TOP 10 STATES - 1988
(AGES 6-13)

RANK	STATE
1	IDAHO
2	WISCONSIN
3	IOWA
4	FLORIDA
5	CALIFORNIA
6	MICHIGAN
7	KANSAS
8	NEW YORK
9	MISSOURI
10	MINNESOTA

FIGURE 20

TOP 10 STATES - 1988
(AGES 14-17)

RANK	STATE
1	SOUTH CAROLINA
2	NEBRASKA
3	KANSAS
4	WISCONSIN
5	FLORIDA
6	IDAHO
7	CALIFORNIA
8	MINNESOTA
9	GEORGIA
10	IOWA

FIGURE 21

STATES APPEARING ON TOP TEN LISTS
FOR BOTH 6-13 AND 14-17 (AGES)
1985-1988

STATE	YEAR
KANSAS	88,87
WISCONSIN	88,85
CALIFORNIA	88
FLORIDA	88
IDAHO	88
IOWA	88
MINNESOTA	88
GEORGIA	85
ILLINOIS	85
OHIO	85

FIGURE 22

- - DATA SUMMARIES - -

MEAN SCORES FOR 6 AND 7 YEAR OLD MALES AND FEMALES

	1980		1981		1982		1983		1984		1985		1986		1987		1988		1989	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
HEIGHT	48.2	47.6	48.0	47.0	48.4	48.0	48.8	48.2	48.8	48.3	48.7	48.2	48.3	47.6	48.7	48.4	48.7	48.3	48.4	48.0
WEIGHT	55.4	51.3	54.3	53.6	55.3	54.2	55.7	53.7	55.0	53.9	55.2	53.5	55.0	53.4	56.7	54.2	55.6	54.9	55.2	54.5
ENDURANCE RUN	2.33	2.50	2.35	2.65	2.33	2.57	2.35	2.47	2.37	2.55	2.33	2.42	2.37	2.47	2.53	2.43	2.72	2.72	2.60	2.68
SITUPS	20.4	20.2	24.8	21.0	26.6	25.3	26.4	24.7	26.1	24.9	25.1	24.0	26.1	25.9	27.3	27.2	27.1	26.1	27.8	26.5
SIT & REACH	——	——	——	——	——	——	——	——	——	——	——	——	15.2	16.6	16.1	17.7	16.4	17.4	16.7	17.7
PULLUPS	1.9		2.8		1.9		2.4		2.3		2.2		2.1		2.2		2.3		2.4	
FLEXED-ARM HANG		11.2		9.1		10.1		11.6		10.8		10.9		13.2		15.1		14.0		14.1
SHUTTLE RUN	13.1	13.7	13.0	13.6	13.2	13.8	13.0	13.6	13.0	13.5	13.1	13.7	13.4	14.0	13.5	14.1	13.4	13.7	13.3	13.7

MEAN SCORES FOR 8 AND 9 YEAR OLD MALES AND FEMALES

	1980		1981		1982		1983		1984		1985		1986		1987		1988		1989	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
HEIGHT	52.4	52.2	52.6	52.2	52.8	53.3	52.8	52.5	53.0	52.7	52.8	52.5	52.5	52.3	53.0	52.6	52.9	52.6	53.0	52.6
WEIGHT	66.4	67.0	72.7	70.2	68.2	67.0	68.2	68.4	68.4	67.8	68.2	66.9	68.7	67.1	69.8	68.5	69.3	68.5	71.2	69.7
ENDURANCE RUN	4.32	4.58	4.20	5.32	4.35	4.57	4.35	5.05	4.32	5.02	4.30	5.00	4.40	5.02	4.38	5.05	4.92	5.33	4.82	5.45
SITUPS	30.5	28.4	29.5	25.6	34.0	31.9	33.3	30.7	33.1	30.5	33.1	30.4	34.2	31.8	34.6	32.7	34.8	32.5	35.2	33.2
SIT & REACH	——	——	——	——	——	——	——	——	——	——	——	——	15.1	17.0	16.0	18.0	16.4	18.0	16.5	18.1
PULLUPS	2.8		3.6		3.2		3.6		3.4		3.3		3.3		3.0		3.2		2.8	
FLEXED-ARM HANG		20.3		18.0		17.1		14.2		13.9		14.2		18.1		18.3		18.9		18.9
SHUTTLE RUN	11.9	12.2	12.2	12.7	11.9	12.5	11.9	12.4	11.9	12.4	11.7	12.1	12.1	12.6	12.3	12.7	12.1	12.6	12.1	12.5

MEAN SCORES FOR 10 AND 11 YEAR OLD MALES AND FEMALES

	1980		1981		1982		1983		1984		1985		1986		1987		1988		1989	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
HEIGHT	56.7	57.3	56.3	56.7	56.6	57.0	57.0	57.2	56.9	57.1	57.0	57.4	56.6	56.9	56.9	57.1	56.8	57.2	57.0	57.3
WEIGHT	84.0	84.3	86.1	83.9	83.9	83.9	85.0	85.2	84.6	84.9	84.8	86.1	84.0	85.0	85.5	87.6	85.6	87.1	89.7	87.9
ENDURANCE RUN	6.52	7.37	6.53	7.27	6.58	7.43	6.75	7.52	6.68	7.52	6.60	7.40	6.80	7.75	6.87	7.48	6.93	7.80	7.30	7.90
SITUPS	34.6	32.0	34.7	30.4	37.3	34.0	38.1	33.9	37.7	33.3	37.3	34.1	38.4	35.1	38.9	35.8	38.8	35.7	38.8	36.0
SIT & REACH	—	—	—	—	—	—	—	—	—	—	—	—	15.0	17.8	16.2	18.8	16.4	18.9	16.2	18.7
PULLUPS	2.8		4.5		4.2		4.0		3.9		4.8		3.5		3.4		3.6		3.4	
FLEXED-ARM HANG		16.8		18.8		18.5		16.2		14.9		16.7		19.9		21.8		20.9		20.8
SHUTTLE RUN	11.1	11.7	11.6	12.1	11.3	11.7	11.2	11.7	11.2	11.7	11.4	11.6	11.4	12.0	11.4	11.9	11.3	12.0	11.4	11.9

MEAN SCORES FOR 12 AND 13 YEAR OLD MALES AND FEMALES

	1980		1981		1982		1983		1984		1985		1986		1987		1988		1989	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
HEIGHT	61.0	61.5	61.1	60.9	61.0	61.6	61.3	61.3	61.5	61.7	61.6	61.3	61.4	61.5	61.8	61.6	61.7	61.6	61.8	61.5
WEIGHT	102.8	105.1	103.1	103.7	103.6	105.7	104.7	105.3	106.1	106.1	106.3	105.4	104.9	107.6	108.2	108.7	109.9	110.0	111.1	112.0
ENDURANCE RUN	8.37	9.78	8.08	9.30	8.33	9.63	8.43	9.92	8.48	9.87	8.47	9.77	8.67	9.87	8.60	9.82	8.95	10.30	9.12	10.47
SITUPS	38.8	33.1	40.5	35.9	41.2	34.8	42.0	36.6	41.7	36.0	40.7	36.1	42.1	37.1	43.0	38.6	42.6	38.8	42.4	38.6
SIT & REACH	—	—	—	—	—	—	—	—	—	—	—	—	15.2	18.4	16.7	20.3	16.6	20.3	16.5	20.2
PULLUPS	4.8		6.2		5.7		6.0		5.6		5.3		4.7		4.6		4.5		4.7	
FLEXED-ARM HANG		18.2		19.1		16.4		20.3		18.6		17.5		21.9		23.9		24.1		23.9
SHUTTLE RUN	10.5	11.1	10.6	11.1	10.7	11.3	10.6	11.1	10.7	11.2	11.4	11.1	11.2	11.4	10.8	11.3	10.9	11.3	10.8	11.6

MEAN SCORES FOR 14 THROUGH 17 YEAR OLD MALES AND FEMALES

	1980		1981		1982		1983		1984		1985		1986		1987		1988		1989	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
HEIGHT	68.7	63.7	64.1	63.2	67.6	63.7	66.1	63.8	66.6	63.7	67.2	63.7	67.6	63.8	67.6	63.9	67.3	63.7	67.4	63.9
WEIGHT	137.3	119.2	133.0	126.5	133.4	119.8	128.8	120.8	135.1	121.4	137.8	123.1	140.5	124.0	141.3	126.3	139.8	123.4	141.9	126.3
ENDURANCE RUN	7.53	9.63	7.62	9.75	7.47	9.87	7.93	9.80	7.78	10.13	7.72	10.08	7.73	9.93	7.83	10.33	8.07	10.43	8.61	10.70
SITUPS	42.1	35.0	44.7	35.3	43.4	36.2	43.7	37.6	44.7	37.1	44.6	36.6	46.9	39.0	46.4	38.8	48.0	39.7	46.0	38.3
SIT & REACH	—	—	—	—	—	—	—	—	—	—	—	—	16.4	19.4	17.4	20.9	18.3	21.7	17.2	20.3
PULLUPS	9.1		7.5		11.6		7.8		8.2		8.5		8.3		7.8		8.1		9.5	
FLEXED-ARM HANG		18.6		15.1		19.2		17.2		16.1		17.0		23.3		23.2		23.2		23.6
SHUTTLE RUN	9.8	10.8	10.0	11.0	10.7	10.8	10.2	10.8	9.9	11.0	10.2	11.0	10.1	11.3	10.1	11.3	10.0	11.1	10.2	11.4